Covered Area Rainfall Event (26/08/2021 to 29/08/2021)

Excess Rainfall

Event Briefing

Jamaica

6 September 2021

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1 INTRODUCTION

Jamaica was affected by a tropical wave and Tropical Cyclone Ida resulting in adverse weather conditions that occurred in the period between 26 August and 28 August, 2021. During this period, Jamaica was affected by moderate to heavy rainfall.

This event briefing describes the impact of rainfall on Jamaica, which was associated with a Covered Area Rainfall Event (CARE), starting on 26 August and ending on 29 August, 2021. The Rainfall Index Loss (RIL) was below the attachment point of the excess rainfall policy for Jamaica and therefore no payout is due.

2 EVENT DESCRIPTION

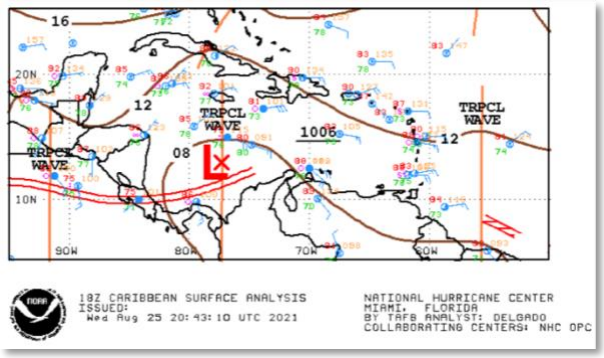
On 25 August, moderate to isolated strong showers developed in the central Caribbean Sea over the waters to the south of Haiti and Jamaica from latitude 10° North to 20° North and between longitude 77° West and 70° West due to the passage of a tropical wave moving westward across the central Caribbean Sea (Figure 1a). The tropical wave had an embedded minimum pressure centre of 1006 mb.

On 26 August, the moderate to heavy precipitation related to the tropical wave affected Jamaica for the entire day (Figure 2a). At 2100 UTC, the tropical wave developed a low-level closed circulation and at 2120UTC, the US National Hurricane Center (NHC) reported that the wave evolved into a tropical storm, which was named Ida. Its centre was located at approximately latitude 18.0°North and longitude 79.8° West at about 96 mi (155 km) west of Negril, Jamaica (Figure 1b). The minimum central pressure was 1006 mb and the maximum sustained winds were estimated at 40 mph (65 km/h). The system moved towards the northwest with an estimated forward velocity of 14 mph (22 km/h). At this stage of development, the satellite imagery showed that the cloud pattern of the system and the wind field were asymmetric, likely due to a southwesterly vertical wind shear affecting the vertical structure of the tropical storm (Figure 2a). Moreover, this condition prevented a rapid intensification of the system and nine hours later, on 27 August at 0600UTC, the tropical storm had the same strength. At this time the centre of Ida passed through the Cayman Islands (at latitude 19.4° North and longitude 80.9° West), about 184 mi (296 km) northwest of Negril, Jamaica. The tropical storm moved towards the northwest with an estimated forward velocity of 12 mph (19 km/h) and in the following hours its centre moved away from the Cayman Islands heading towards the northwest Caribbean Sea.

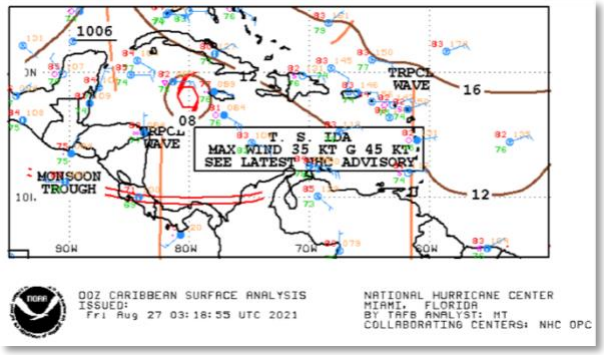
Over the waters to the north of the Cayman Islands, a decrease in the wind shear combined with the warm sea surface and the moist environment supported a steady strengthening of the tropical cyclone. At 1200 UTC, the maximum sustained winds increased to 60 mph (95 km/h) and the minimum central pressure was estimated at 996 mb. The centre of Ida was located at latitude 20.3° North and longitude 81.7° West, about 75 mi (125 km) NNW of Grand Cayman, Cayman Islands. A few hours later, at 1710 UTC, the NHC reported that Ida became a Category 1 hurricane as it approached the Isle of Youth, Cuba (Figure 1c). Despite the increasing distance of the centre of Ida from Jamaica, the gradual intensification of the system led to the continuation of rainfall over this country during the entire day of 27 August. Moderate to

locally intense precipitation affected Jamaica due to the outer rainband of Ida (Figure 2b).

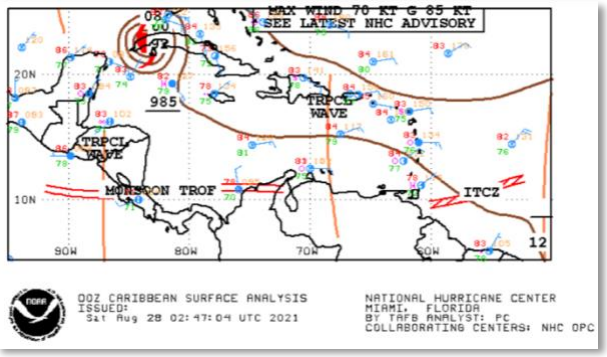
On the following two days, Ida intensified rapidly while traversing the Gulf of Mexico, becoming a Category 4 hurricane on 29 August at 0700UTC while its centre was located near latitude 27.7° North and longitude 88.8° West. At 1655UTC, Ida made landfall in Louisiana, United States of America, as a Category 4 hurricane. During 28 and 29 August, some instability remaining after the passage of Ida led to the development of scattered showers of moderate intensity over the northwest Caribbean Sea and over Jamaica.



a) 25 August at 1800UTC



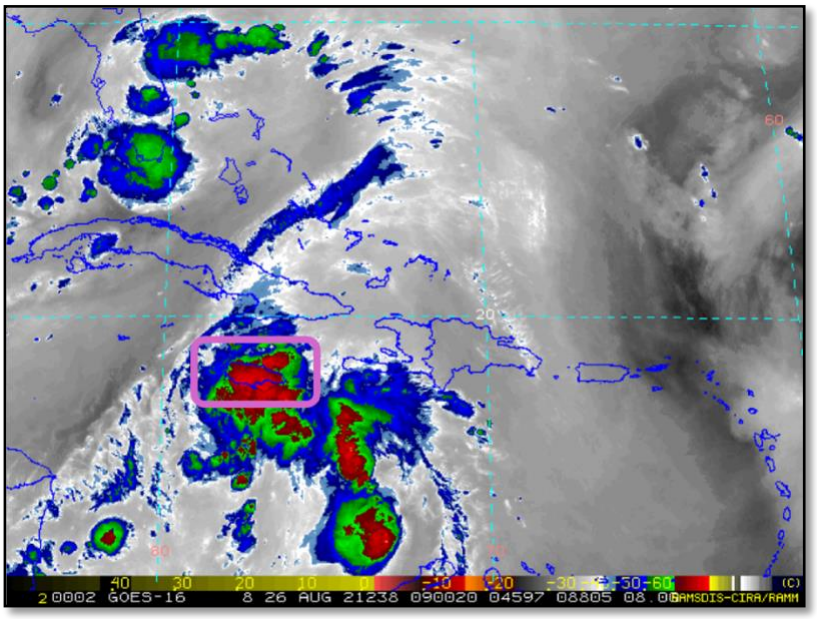
b) 27 August at 0000UTC



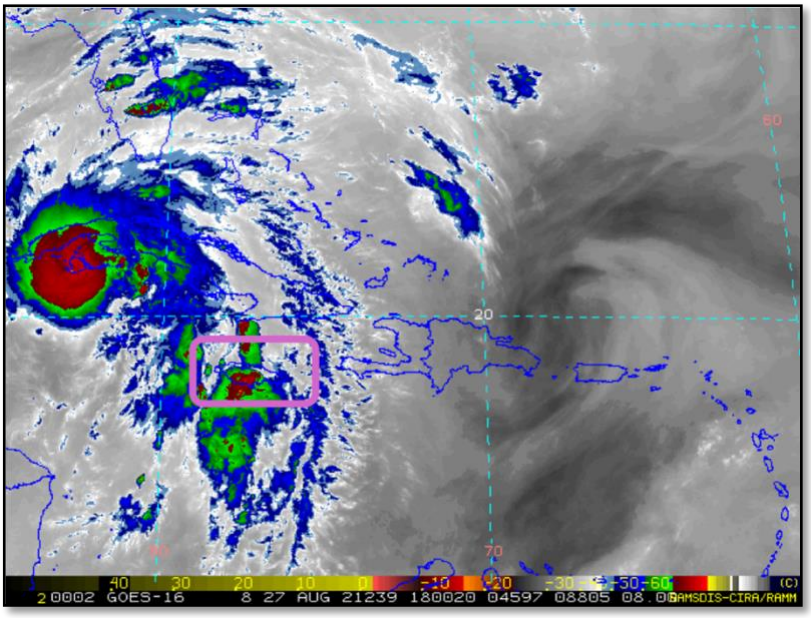
c) 28 August at 0000UTC

Figure 1 Surface analysis over the Caribbean area at different times as indicated by the labels. Source: US National Hurricane Center[1]

[1] National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review dates: 25 to 28 August, 2021, available at: *https://www.nhc.noaa.gov/tafb/CAR_18Z.gif* and *https://www.nhc.noaa.gov/tafb/CAR_00Z.gif*



a) 26 August at 0900UTC



b) 27 August at 1800UTC

Figure 2 Satellite imagery at different times as indicated by the labels from thermal infrared channel enhanced with colour. Blue/green colours represent high altitude clouds (top cloud temperature between -50°C and -70°C), while the red/yellow colours represent very high altitude clouds (top cloud lower than -70°C). High altitude clouds indicate strong convection associated with intense precipitation. Source: NOAA Satellite and Information Service[2].

[2] RAMSDIS Online Archive, NOAA Satellite and Information Service, available at:
https://rammb.cira.colostate.edu/ramsdis/online/images/rmtc/rmtcsasec4ir304/rmtcsasec4ir304_20210826090020.gif
https://rammb.cira.colostate.edu/ramsdis/online/images/rmtc/rmtcsasec4ir304/rmtcsasec4ir304_20210827180020.gif

3 IMPACTS

The National Works Agency (NWA) reported that the parishes of St. Catherine, Clarendon, St. Thomas, St. Elizabeth, St. Ann, St. Andrew and Manchester were affected following the passage of Tropical Storm Ida. The majority of the impacts were related to flooding, landslides, and fallen trees that affected roads and infrastructure.

According to information published in the local news[3], in St. Catherine, due to heavy rains, several roads in Spanish Town and some communities were flooded. Several roads were left impassable. Due to the floods, residents of Willowdene were unable to get out of their houses. In Clarendon, due to heavy rains and landslides occurred, resulting in impassable roads and breakaways, while in St. Andrew, Weise Road was affected by the overflowing of the Chalky River.

According to the reports from the Meteorological Service, Jamaica and the Office of Disaster Preparedness and Emergency Management (ODPEM), Tropical Storm Ida was closely monitored. Prior to the arrival of the storm, a Flash Flood Warning alert was put into effect for all parishes.

Figure 3 shows some of rainfall damage caused by Tropical Storm Ida in Jamaica.

Figure 3 Some of rainfall damage caused by Tropical Storm Ida in Jamaica – August, 2021.
Source: The National Works Agency and The Gleaner Company

[3] The Gleaner Company, review date: 5 September 2021, available at: '*Ida romps to hurricane status leaving a trail of devastation*'

4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH[4], WRF5 and WRF7[5], detected the occurrence of precipitation over Jamaica and the surrounding waters during the period 24 – 29 August 2021. However, each data source reported a specific distribution and accumulation of rainfall, as discussed below. The CARE for Jamaica was activated on 26 August and lasted for the period 26 – 29 August. The CARE was activated due to the use of the 12-hour and the 48-hour aggregation intervals for precipitation[6], thus the period considered by the XSR 2.5 model for the loss estimate based on the accumulated precipitation in Jamaica was 24 – 29 August.

CMORPH reported total accumulated amounts of precipitation higher than 120 mm over most of Jamaica. The largest values were shown over the southwestern sector, in the parishes of Manchester and St. Elizabeth, where the values were in the range between 220 mm and 280 mm.

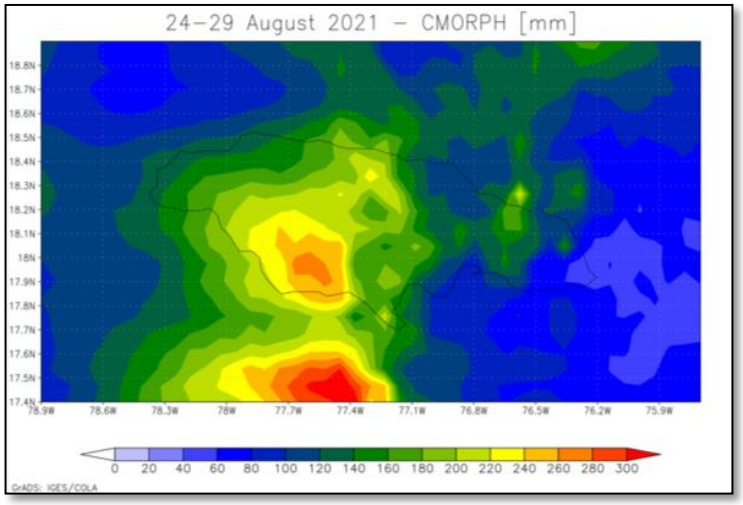
WRF5 showed total accumulated values of precipitation higher than 60 mm over three areas of Jamaica: over the eastern section of the country (in Portland and St. Thomas), where the largest values were between 280 mm and 300 mm, over the central southern sector (mainly in Manchester), where the peak values were in the range between 120 mm and 140 mm, and over the western portion of the island (in St. James, Hanover and Westmoreland), where the maximum values were in the range between 80 mm and 100 mm.

WRF7 simulated total accumulated values of rainfall with a similar pattern to that of WRF5. The highest values of precipitation were presented in the central southern area, where the maximum values were in the range between 140 mm and 180 mm. Over the western and eastern parts of the country, the reported precipitation varied between 40 mm and 120 mm.

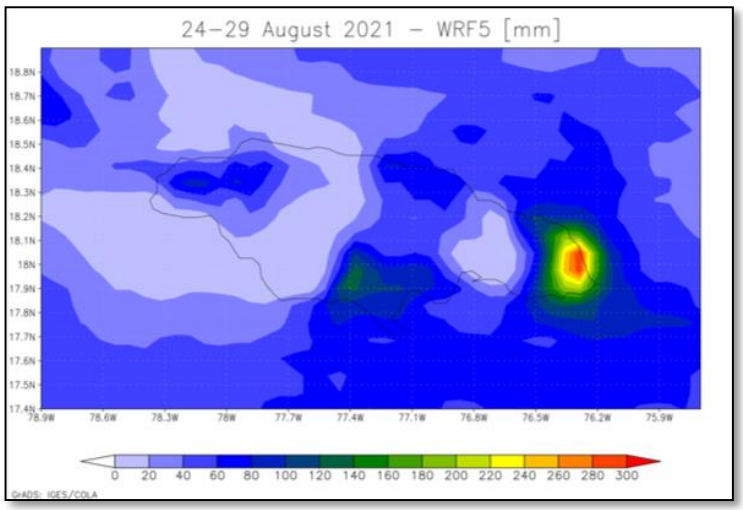
[4] CMORPH Model: the satellite-based rainfall precipitation estimates provided by the NOAA Climate Prediction Center (CPC) using the so-called Morphing Technique *http://www.cpc.ncep.noaa.gov/products/janowiak/cmorph_description.html*. Further details in the Definitions section of this report.

[5] WRF5 and WRF7 Models: the Weather Research and Forecasting Model weather model-based Configuration #1 and #2 data *https://www.mmm.ucar.edu/weather-research-and-forecasting-model*. These data are initialised by the NCEP FNL dataset. (NCEP FNL Operational Model Global Tropospheric Analyses [*http://rda.ucar.edu/datasets/ds083.2/*]). Further details in the Definitions section of this report.

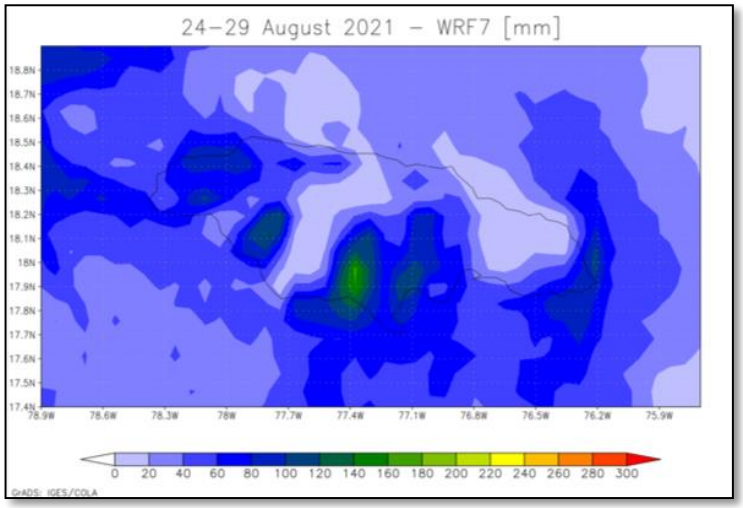
6 The two aggregation periods correspond to the Rainfall Aggregation Period #1 and Rainfall Aggregation Period #2, as indicated in the Schedule. Further details in the Definitions section of this report.



a) CMORPH



b) WRF5



c) WRF7

Figure 4 Total accumulated precipitation during the period 24 – 29 August, 2021 estimated by CMORPH (a), WRF5 (b) and WRF7 (c). Source: CCRIF SPC

Daily rainfall maps by CMORPH, WRF5 and WRF7 over the exposure map of XSR 2.5 are not included here and they can be downloaded at the following links for 12-hour aggregation and 48-hour aggregation respectively:

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/JAM/CARE_3_2021/daily_prec_short.mp4
https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/JAM/CARE_3_2021/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Jamaica for all three data sources used by XSR 2.5: CMORPH, WRF5 and WRF7. The RIL was the highest for CMORPH, due to the higher amount of accumulated precipitation presented across Jamaica and in particular in the central southern area, in the vicinity of the city of Mandeville, an area characterized by moderate to high exposure for Jamaica.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs from the three data sources. The RIL_{FINAL} was greater than zero and therefore this CARE qualified as a loss event. However, the RIL_{FINAL} was below the attachment point of Jamaica's excess rainfall policy and therefore it did not trigger a policy payment.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event was below the attachment point of Jamaica's excess rainfall policy and therefore no payout is due.

For additional information, please contact CCRIF SPC at: pr@ccrif.org

DEFINITIONS

Active Exposure Cell Percentage Threshold	The percentage of the total number of XSR Exposure Grid Cells within the Covered Area of the Insured, that must be exceeded to trigger a Covered Area Rainfall Event.
Active Exposure Grid Cells	The XSR Exposure Grid Cells for which in the same single day the Aggregate Rainfall #1 value computed using the CMORPH-based Rainfall Estimate equals or exceeds the Rainfall Event Threshold #1 or the Aggregate Rainfall #2 value computed using the CMORPH-based Rainfall Estimate equals or exceeds the Rainfall Event Threshold #2.
Aggregate Rainfall #1	The rainfall amount accumulated over the Rainfall Aggregation Period #1 (as defined in the Schedule) measured in millimeters (mm) in any of the XSR Exposure Grid Cells in the Covered Area of the Insured. For a given day and a Rainfall Aggregation Period #1 of n hours, the Aggregate Rainfall #1 is the maximum amount of rainfall accumulated over any of the n-hour windows that intersect the day itself considering a time interval of 3 hours.
Aggregate Rainfall #2	The rainfall amount accumulated over the Rainfall Aggregation Period #2 (as defined in the Schedule) measured in millimeters (mm) in any of the XSR Exposure Grid Cells in the Covered Area of the Insured. For a given day and a Rainfall Aggregation Period #2 of n hours, the Aggregate Rainfall #2 is the maximum amount of rainfall accumulated over any of the n-hour windows that intersect the day itself considering a time interval of 3 hours.
Calculation Agent	Entity charged with undertaking the primary calculation of the Rainfall Index Loss.
CMORPH-based Maximum Aggregate Rainfall #1	The maximum value during the Covered Area Rainfall Event of the Aggregate Rainfall #1 computed using the CMORPH-based Rainfall Estimates in any given XSR Exposure Grid Cell over the Covered Area of the Insured.
CMORPH-based Maximum Aggregate Rainfall #2	The maximum value during the Covered Area Rainfall Event of the Aggregate Rainfall #2 computed using the CMORPH-based Rainfall Estimates in any given XSR Exposure Grid Cell over the Covered Area of the Insured.
CMORPH-based Covered Area Rainfall Parameters	The CMORPH Model information provided on a continuous basis by the XSR Model Data Reporting Agency used by the Calculation Agent to obtain the CMORPH-based Rainfall

	Estimates using the XSR Rainfall Model. Parameters are drawn from XSR Exposure Grid Cells within the Covered Area of the Insured, by their respective latitude and longitude. Measurement units and precision of data ingested by the XSR Rainfall Model are identical to those provided by the XSR Model Data Reporting Agency and are further elaborated in the Attachment entitled 'Calculation of Rainfall Index Loss and Policy Payment'.
CMORPH Model	The satellite-based rainfall estimation model provided by NOAA CPC as described in the Rainfall Estimation Models section of the Policy.
Covered Area	The territory of the Insured as represented in the XSR Rainfall Model.
Covered Area Rainfall Event	Any period of days, with an interruption less than or equals to the Event Tolerance Period, during which the number of Active Exposure Grid Cells is greater than or equal to the product of (a) Active Exposure Cell Percentage Threshold multiplied by (b) the total number of XSR Exposure Grid Cells within the Covered Area.
Country Disaster Alert	An official disaster alert issued by ReliefWeb (*http://reliefweb.int/*) for the country in question for one of the following types of events: tropical cyclone, flood, flash flood and severe local storm. Any disaster alert issued later than seven (7) days after the completion of the Covered Area Rainfall Event (CARE) event will not be considered. The Disaster Alert description issued by ReliefWeb and/or its attached documentation must include specific reference to the CARE dates with a tolerance period of 2 calendar days.
Maximum Aggregate Rainfall #1	The highest value during a Covered Area Rainfall Event of the Aggregate Rainfall #1 amount in any of the XSR Exposure Grid Cells in the Covered Area of the Insured computed.
Maximum Aggregate Rainfall #2	The highest value during a Covered Area Rainfall Event of the Aggregate Rainfall #2 amount in any of the XSR Exposure Grid Cells in the Covered Area of the Insured computed.
Rainfall Event Threshold #1	Aggregate Rainfall #1 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.
Rainfall Event Threshold #2	Aggregate Rainfall #2 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.

Rainfall Aggregation Period #1	The number of hours over which the Aggregate Rainfall #1 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
Rainfall Aggregation Period #2	The number of hours over which the Aggregate Rainfall #2 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
Rainfall Index Loss	For any Covered Area Rainfall Event affecting the Insured, the US Dollar loss calculated by the Calculation Agent using the XSR Rainfall Model, as described in the Attachment entitled 'Calculation of Rainfall Index Loss and Policy Payment'. The Rainfall Index Loss can only be calculated once the Covered Area Rainfall Event is completed.
WRF5 Model	The weather research and forecasting rainfall model by NOAA with Configuration #5 data initialized with and assimilating the data provided by the National Center for Environmental Prediction as described in the Rainfall Estimation Models and in the Input Data to the Rainfall Estimation Models sections of this Attachment.
WRF7 Model	The weather research and forecasting rainfall model by NOAA with Configuration #7 data initialized with and assimilating the data provided by the National Center for Environmental Prediction as described in the Rainfall Estimation Models and in the Input Data to the Rainfall Estimation Models sections of this Attachment.
XSR Rainfall Model	The computer model used to calculate the Rainfall Index Loss, as described in the Attachment entitled 'Calculation of Rainfall Index Loss and Policy Payment'.
XSR Exposure Grid Cells	The 30 arc-second by 30 arc-second grid of cells each of which is attributed with an XSR Grid Cell Exposure Value greater than zero.
XSR Grid Cell Exposure Value	The value, used to calculate the CMORPH-based Exposure Grid Cell Loss, the WRF5-based Exposure Grid Cell Loss, and the WRF7-based Exposure Grid Cell Loss.